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(71) Applicant(s)
Monaghan Poultry Research Limited

(Incorporated in Ireland)

GALLINAGH, County Monaghan, Ireland

(72) Inventor(s)
Barry McEntee

(74) Agent and/or Address for Service
Marks & Clerk
57-60 Lincoln's Inn Fields, LONDON, WC2A 3LS,
United Kingdom

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GB 2264217 A US 4860403 A

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UK CL (Edition L) A1M MDD MDE , A2U U1MX U1PX
INT CL^5 A22B , A22C

(54) A method of processing poultry

(57) Poultry is processed by a method in which live poultry are unloaded, shackled, stunned, slaughtered, prepared for the oven, washed, passed through an air chilling room, where cold water is periodically sprayed onto the surface of the poultry, whereafter the chilled poultry is weighed and packed.

GB 2 280 093 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

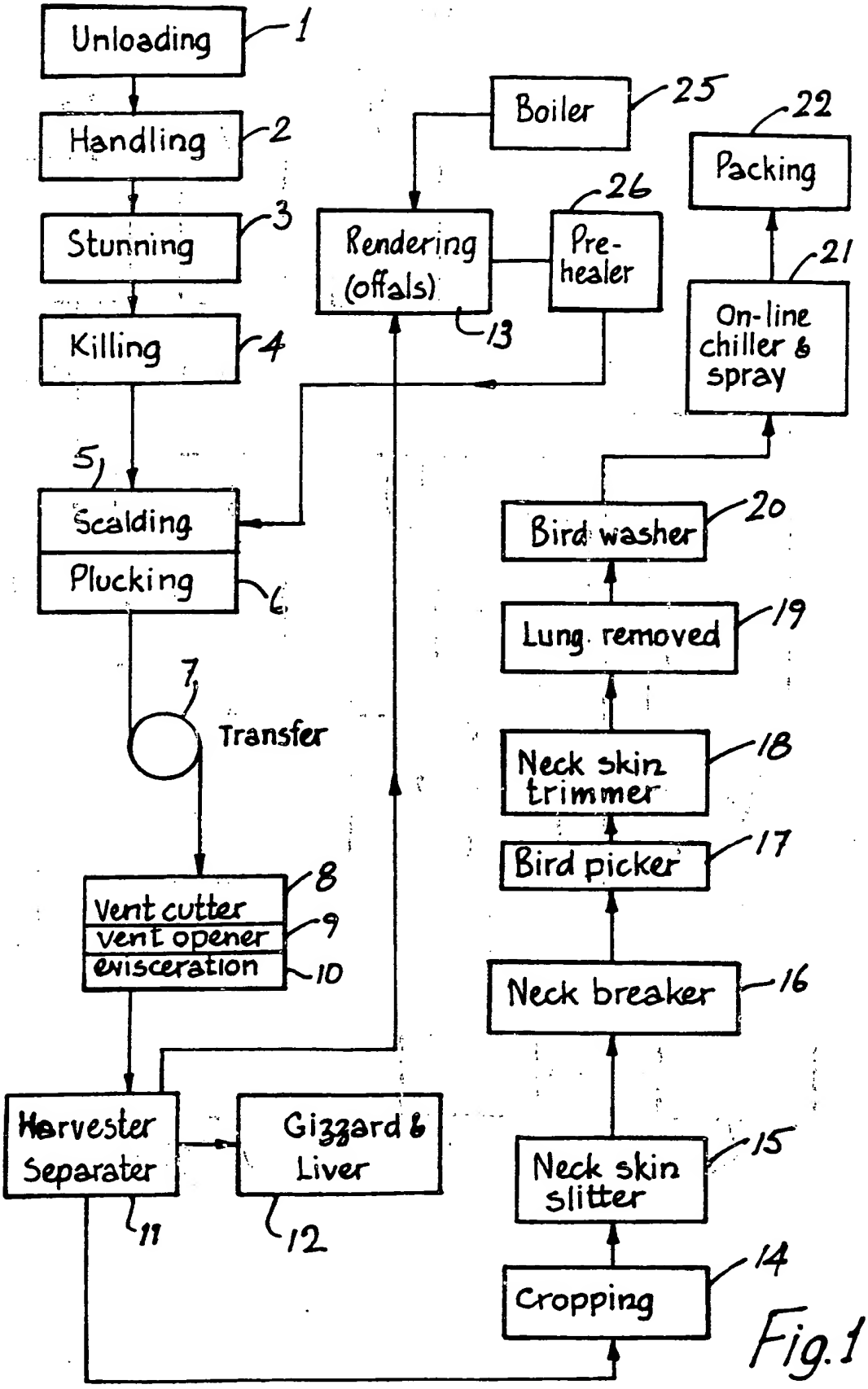
Unloading
1
Handling
2
Stunning
3
Killing
4
5
Scalding
Plucking
6
7
Transfer
8
Vent cutter
9
vent opener
evisceration
10
Harvester
Separater
11
Gizzard &
Liver
12
Rendering
(offals)
13
Boiler
25
26
Pre-
heater
22
Packing
21
On-line
chiller &
spray
20
Bird washer
19
Lung removed
18
Neck skin
trimmer
17
Bird picker
16
Neck breaker
15
Neck skin
slitter
14
Cropping

Fig. 1

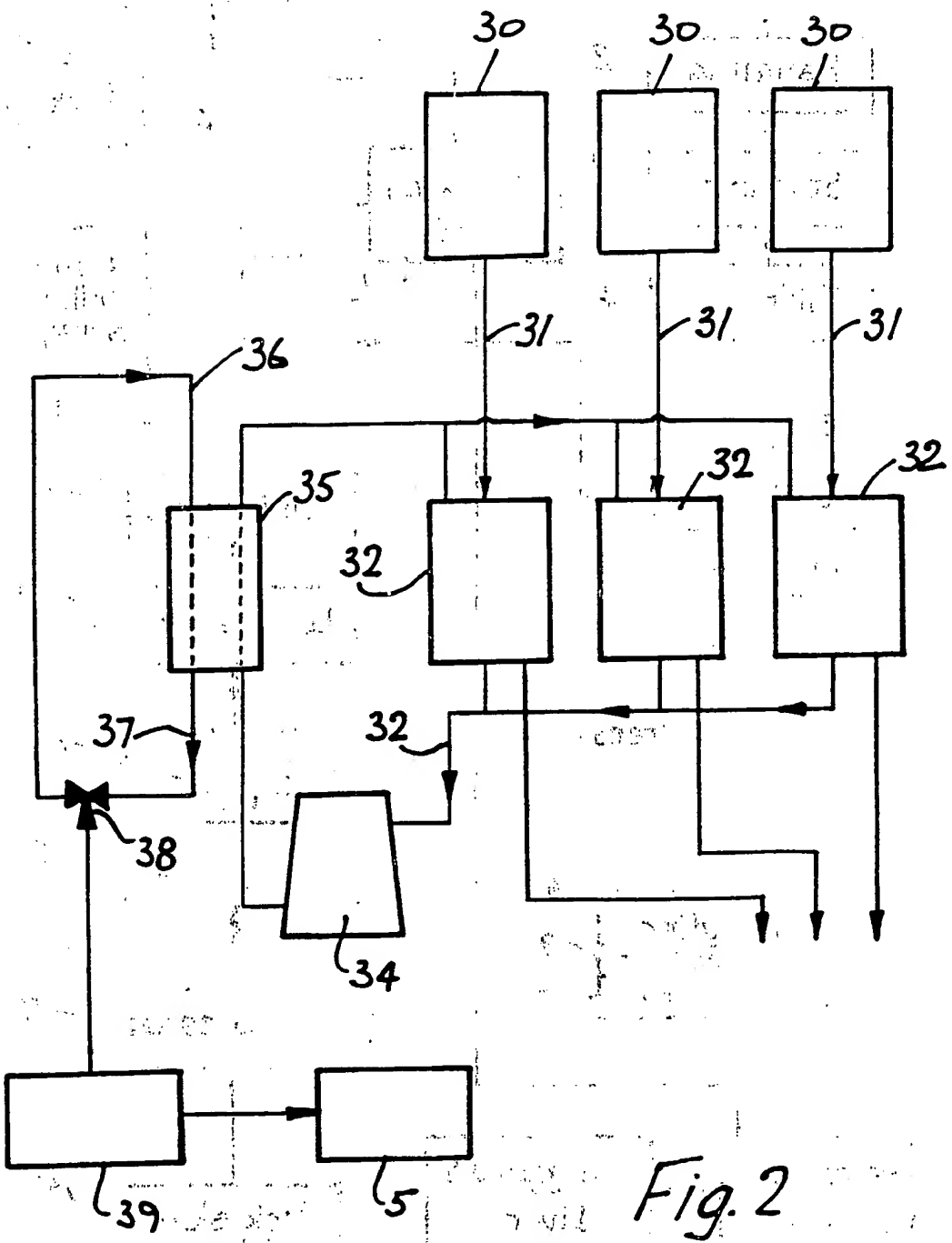

Fig. 2

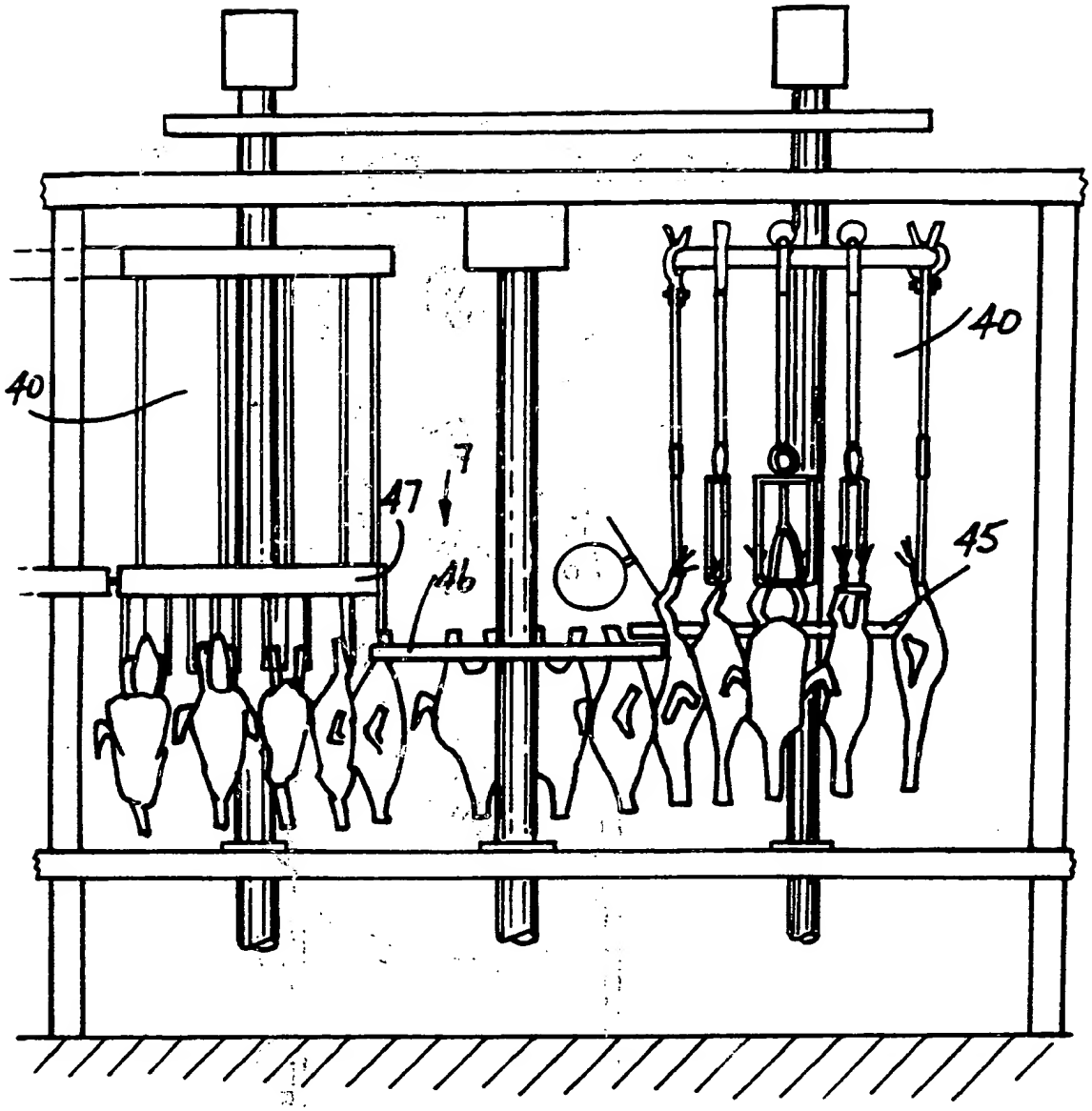

Fig. 3

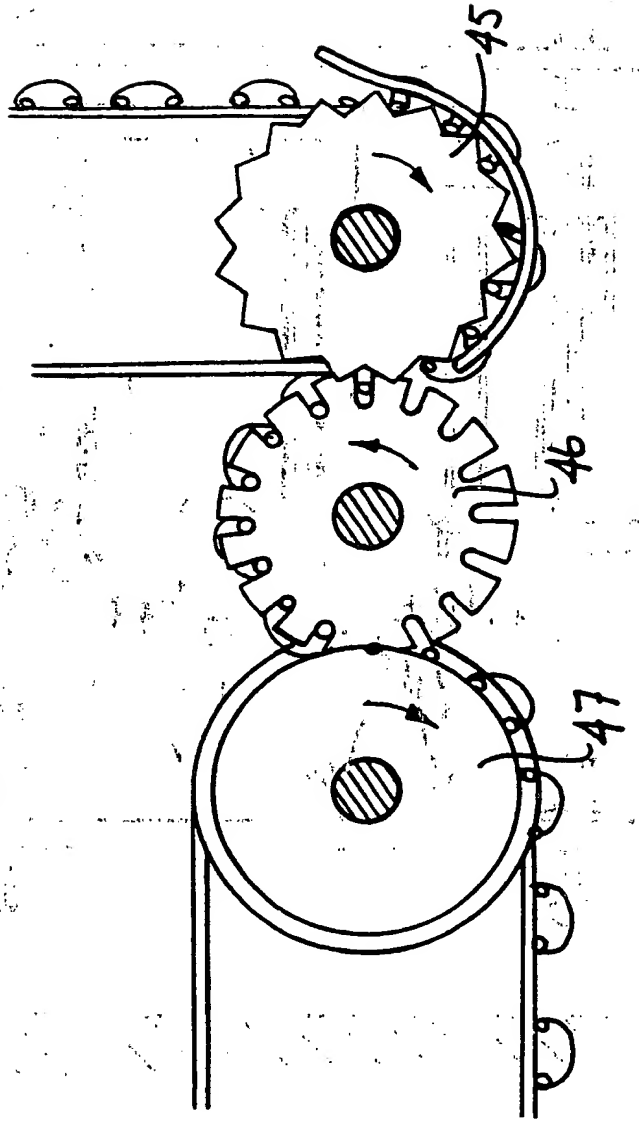

Fig. 4

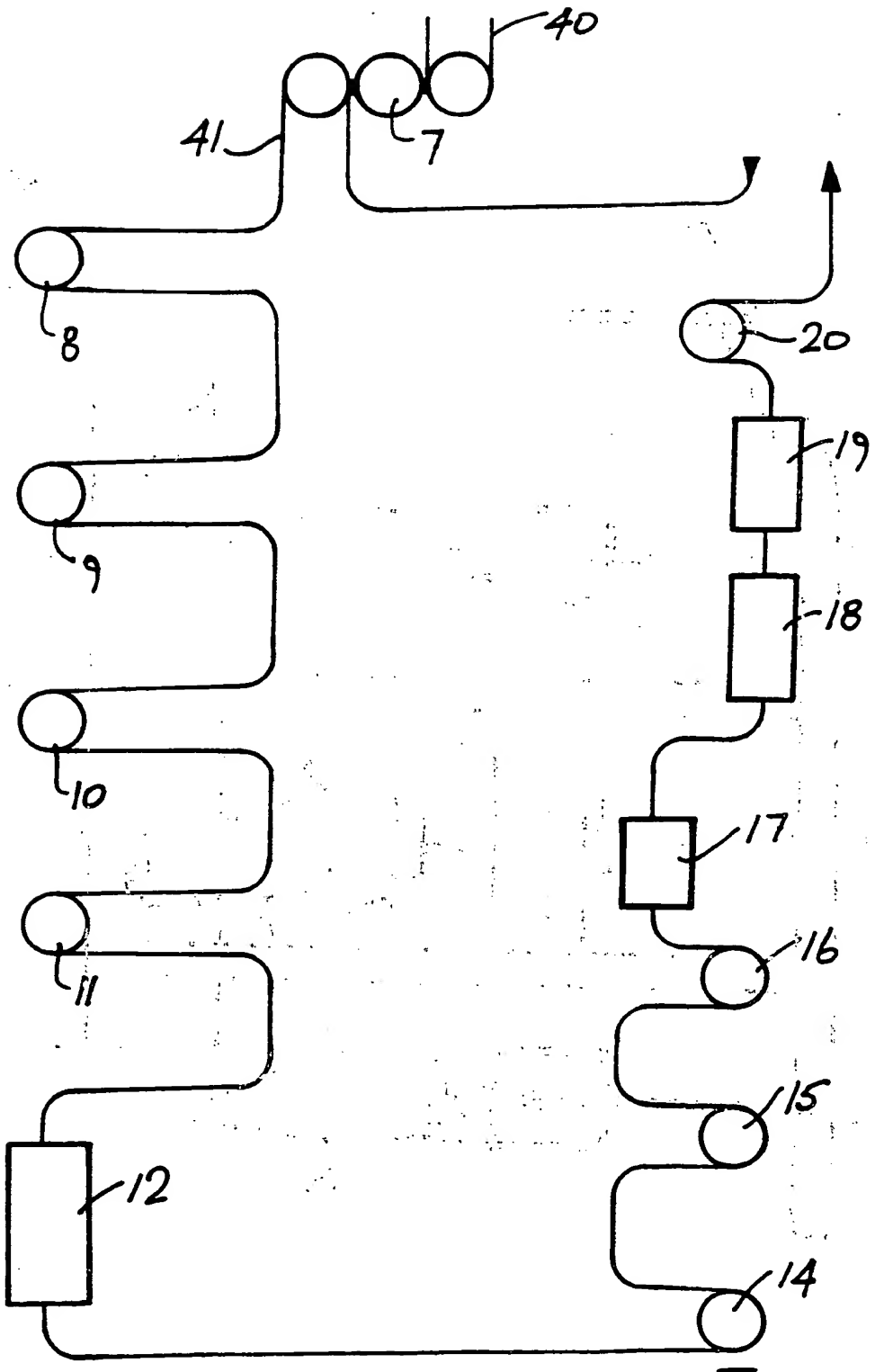

Fig.5

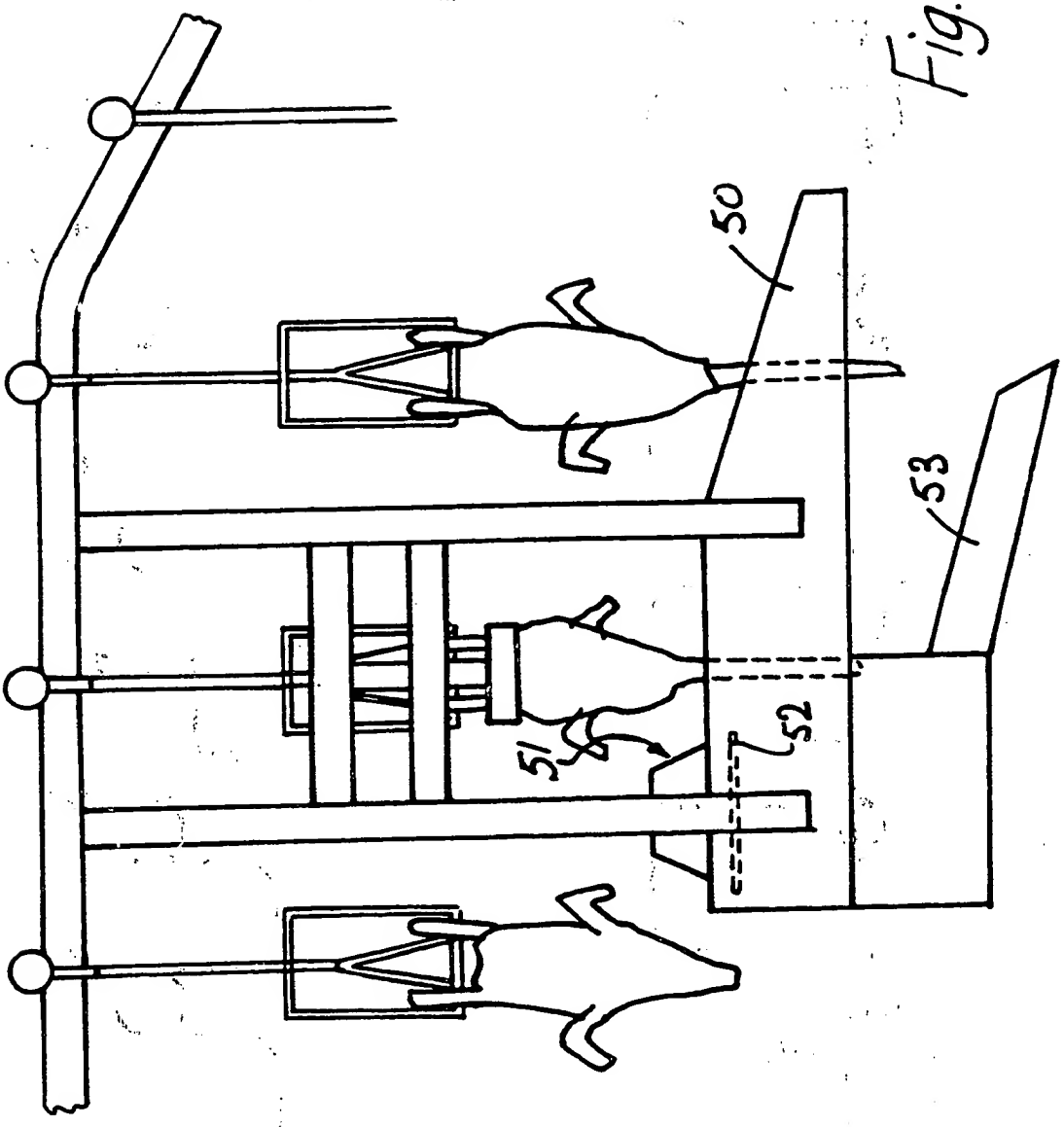

Fig. 6

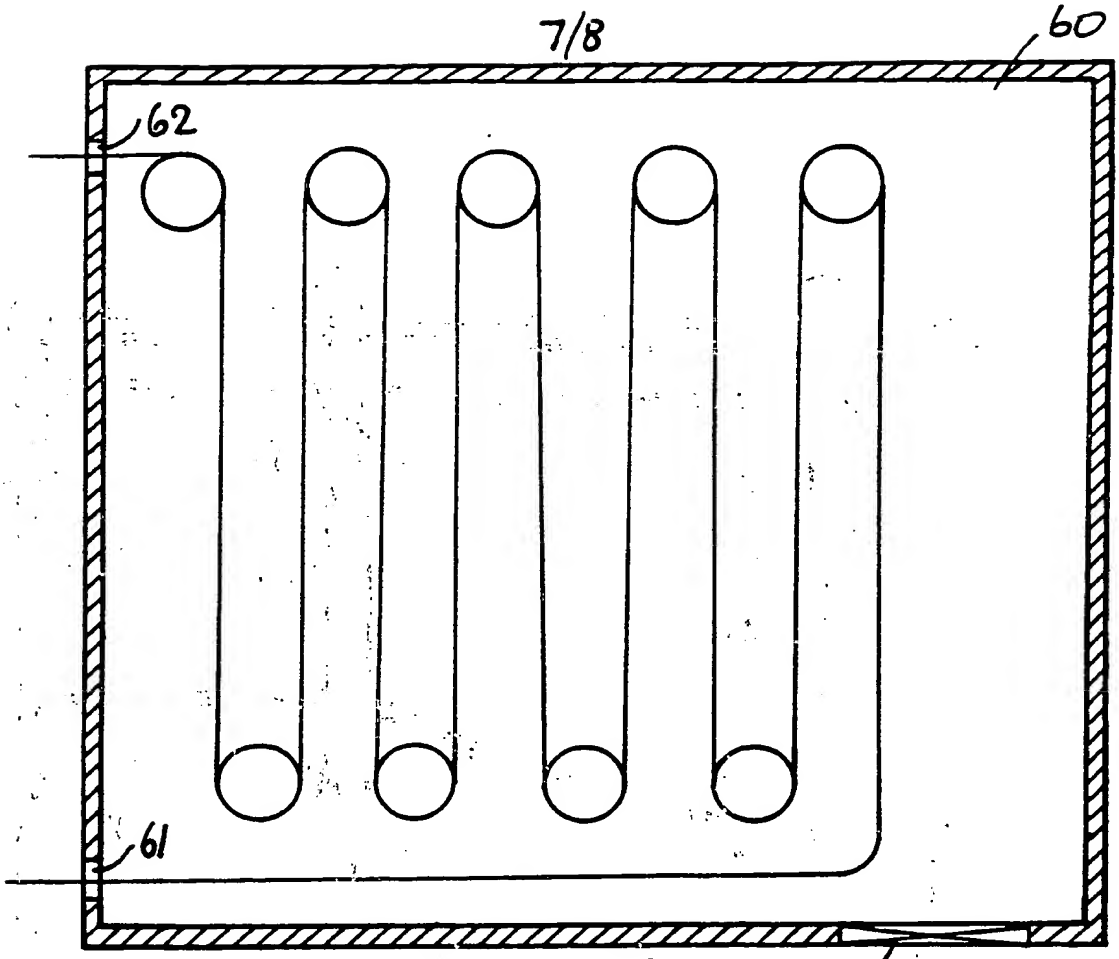

Fig. 8

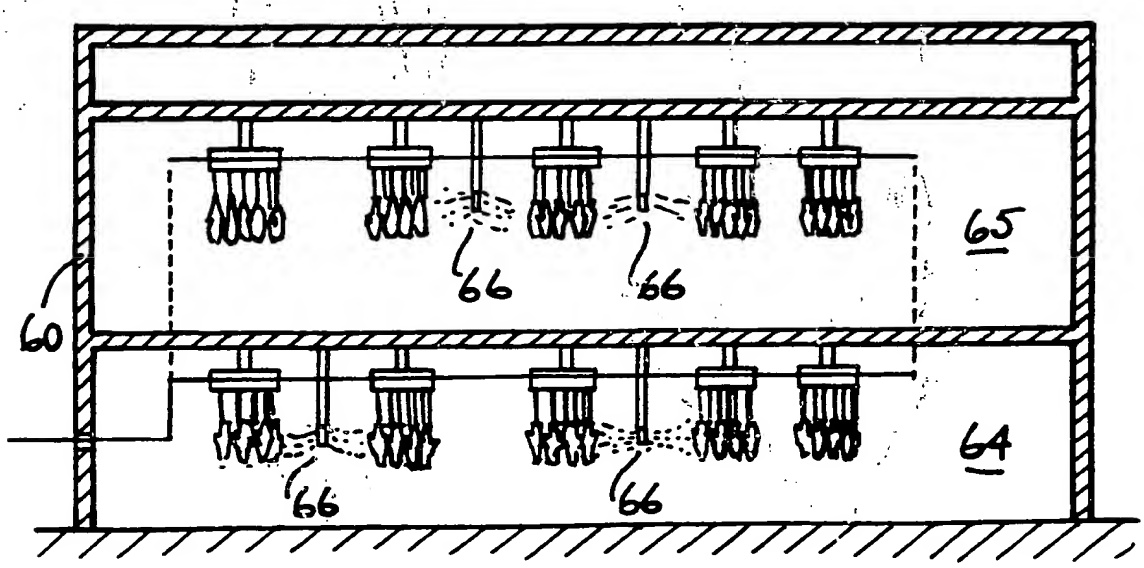

Fig. 7

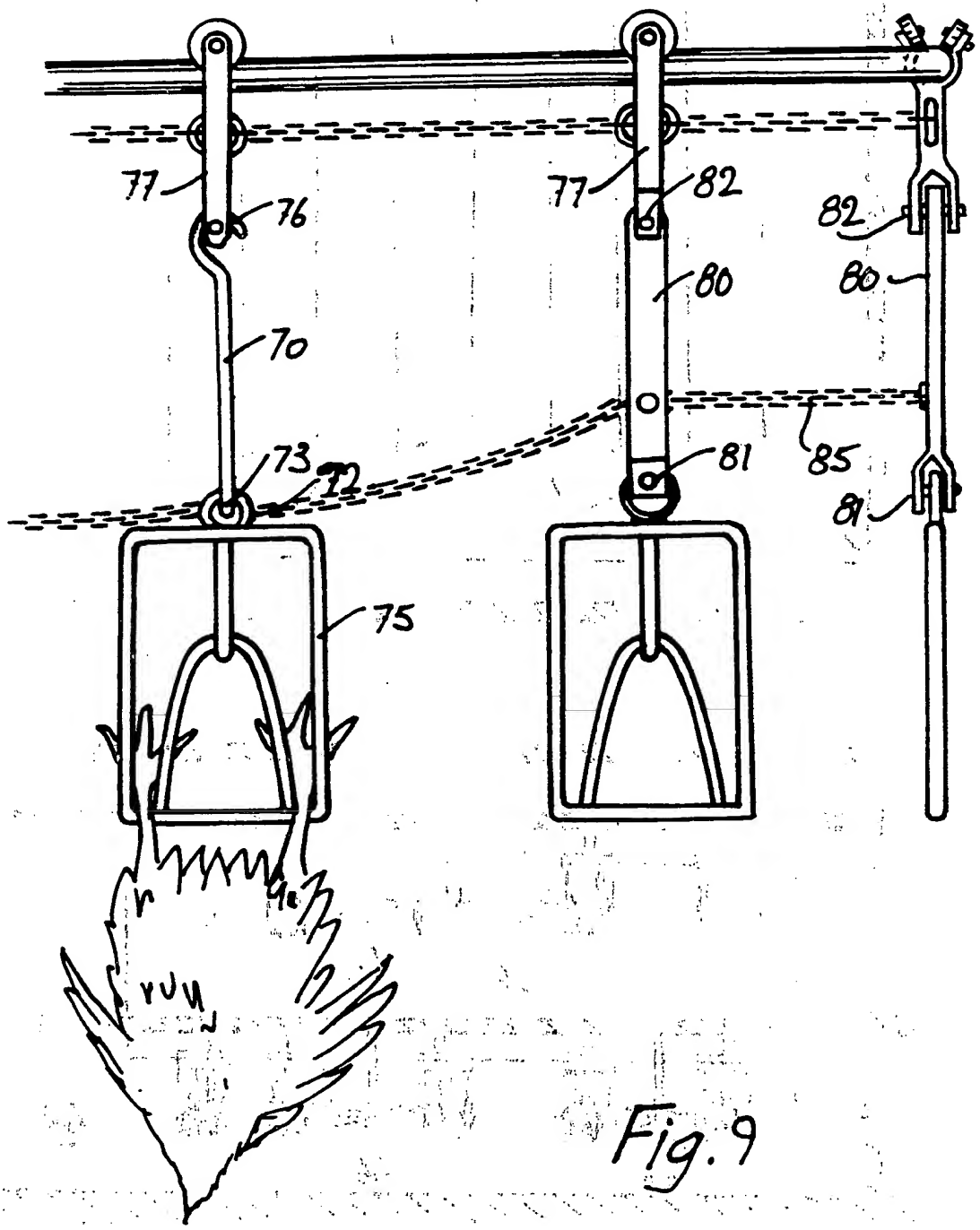

Fig. 9

"A method of processing poultry"

The invention relates to a method of processing poultry and in particular to a method for processing chickens.

Processing poultry on a large scale involves a very large number of separate but interlinked steps. For processing efficiency it is essential that poultry is made available to every step in the process on demand. This is particularly important in processing poultry in a minimum possible time from killing through to packaging.

There are a number of problems with conventional methods for processing poultry. One problem is that some of the steps in the process prior to evisceration require large amounts of heat input and are therefore expensive. A further problem is that the transfer of poultry from the pre-evisceration to the evisceration stages is generally difficult and labour intensive. Another problem is that conventional methods for chilling poultry prior to evisceration can lead to drying out of the surface of the poultry leading to an inferior texture, taste and appearance when poultry is subsequently cooked. There are a number of other problems with conventional methods for processing poultry and this invention is directed towards providing an improved process for processing poultry which will overcome at least some of these difficulties.

According to the invention there is provided a method of processing poultry comprising the steps in sequence of:-

unloading live poultry from crates,

hanging the poultry on a shackle,

stunning the poultry,

killing the poultry,

passing the poultry through a scalder, preheating supply water for the scalder being preheated in a preheater,

plucking feathers from the poultry in a plucking machine,

transferring the poultry from a take-off line from the scalder to an input to an evisceration line,

cutting the poultry vent,

eviscerating the poultry through the vent,

harvesting usable organs from the poultry and passing remaining offal to a rendering process,

cropping the poultry,

slitting the neck of the poultry,

breaking the neck of the poultry,

plucking any remaining feathers from the poultry,

trimming the neck skin of the poultry,

removing the lungs from the poultry,

washing the poultry,

leading the poultry through an air chilling room,

periodically spraying cold water onto the surface of the poultry as it is led through the air chilling room,

weighing the chilled poultry, and

packing the poultry.

In one embodiment of the invention the method includes the steps of:-

rendering offal produced in the poultry processing method,

extracting waste heat from the rendering process, and

using the extracted waste heat for preheating the water supply to the scalder.

Preferably, the rendering includes the step of cooking the offal in a cooker and the waste heat is extracted from steam generated in the cooker.

In a particularly preferred embodiment of the invention the method includes the step of condensing the cooker steam to produce hot water, and extracting heat from the hot water to heat a water supply to the scalder.

In a preferred embodiment of the invention the method includes the step of sensing the temperature of the heated scalder water supply and delivering the heated scalder water to the scalder when a preset temperature of scalder water supply has been achieved, scalder water being circulated through the heat exchanger until the preset temperature has been reached. Preferably, the preset

temperature for the scalder water supply is approximately 55°C.

In one arrangement, excess hot water generated on condensing the cooker steam is cooled in a cooling tower.

In another embodiment of the invention, the method includes the steps of sensing the speed of the take-off line from the scalder and the speed of the evisceration line, and matching the speed of the lines. Preferably the speeds of the lines are sensed by tachometers which provide input signals to a controller, the controller delivering output signals to change the speed of the conveyor lines as required to match the speeds of the infeed and take off lines at the transfer station. Most preferably the output from the controller varies the speed of the motors driving the conveyor lines. Typically the speed of the motors are varied by regulating the frequency of the power supply to the motors.

In a further embodiment of the invention, poultry are led through the poultry are led through lower and upper levels in a chiller room and cold water is periodically sprayed onto the surface of the poultry as it is led through the lower and upper levels of the chiller room. Preferably the poultry is chilled to a temperature of approximately 0°C. The residence time in the chiller room is preferably at least 20 and most preferably approximately 30 minutes.

In a still further embodiment of the invention, the neck skin is trimmed by leading the poultry with the necks lowermost along a ramp to a cutting station having a cutting blade which removes the neck skin as the poultry passes through the cutting station.

In a particularly preferred embodiment of the invention, the method includes the step of preventing excess swing of a shackle by hanging the poultry on a shackle having a shackle bar which is pivotally mounted at a lower end to a poultry handling hook means and at an upper end to an overhead conveyor hook, a semi-flexible link extending between adjacent shackles intermediate the ends thereof.

The invention also provides poultry whenever processed by the method of the invention.

The invention will be more clearly understood from the following description thereof given by way of example only with reference to the accompanying drawings in which:-

Fig. 1 is a block diagram illustrating a method of processing poultry according to the invention,

Fig. 2 is an illustration of one step in the method of the invention,

Fig. 3 is a side view of a transfer apparatus used in the method of the invention,

Fig. 4 is a plan view of part of the apparatus of Fig. 3,

Fig. 5 is a plan view of a layout of various steps in the method of the invention,

Fig. 6 is a side view of a neck trimming apparatus used in the method of the invention,

Fig. 7 is a side view of a chiller apparatus used in the method of the invention,

Fig. 8 is a plan view of the chiller apparatus of Fig. 7, and

Fig. 9 is an elevational view of a shackle apparatus used in the method of the invention.

Referring to the drawings and initially to Fig. 1, there is illustrated a method for processing poultry according to the invention which comprises the following steps in sequence. Chickens are first unloaded from crates in step 1, then in step 2 they are hung on hooks on an overhead conveyor. The chickens then pass to a stunning station in step 3 and then to a killing station in step 4 where the necks of the chickens are cut and bled. The killed chickens then pass to a scalding station 5 to soften the hair follicles of the feathers and on to a plucking station 6 where softened feathers are plucked from the chickens. After plucking, the chickens pass to a transfer station 7 which transfers the chickens onto an evisceration line. The first step in the evisceration process is the cutting of the chicken vent in step 8, the vent is then opened in step 9 and the innards of the chicken are eviscerated in step 10. In step 11 the innards of the chicken are harvested and saleable parts such as chicken livers are collected in step 12, the remainder of the innards being delivered for rendering in step 13. After evisceration, the chickens are cropped in step 14, the neck skins of the chickens are slit in step 15 and the necks are broken in step 16. In step 17 any remaining feathers are plucked from the skin of the poultry prior to delivery to a neck skin trimming station 18. The lungs are removed from the chicken in step 19. The chickens are washed in step 20, and as will be described in more detail below, after washing the poultry is chilled on-line in step 21 prior to delivery to further processing including packaging in step 22. Hot water /

steam for the scalding in step 5 is provided by a boiler 25, water for the boiler being pre-heated in a pre-heating step 26 by excess heat generated in the rendering process 13.

Referring particularly to Fig. 2 the rendering process 13 includes the cooking of offal in one of a number, in this case three, cookers 20. The steam generated in the cooking process is delivered along steam lines 31 to associated condensers 32 in which the steam is condensed to form hot water which is delivered along line 33 through a cooling tower 34 to a heat exchanger 35. The heat exchanger 35 is fed along line 36 with clean water for use in the scalding process. The water for use in scalding is heated in the heat exchanger 35 by the hot water from the rendering process to provide heated scalding water along line 37 which is re-circulated through the heat exchanger 35 until the temperature of the scalding water reaches a pre-set value, which in this case is 55°C. A three-way valve 38 is operated to deliver the hot water at 55°C to a tank 39 for delivery to the scalding process 5. If excess heat is generated by the rendering cookers 30 which cannot be used in the scalding process a fan of the cooling tower 34 is operated. This cools the water allowing the condensers 32 to continue in operation. The operation of the condensers 32, heat exchanger 35, valve 38 and cooling tower 34 is optimised to provide heated scalding water at a temperature of 55°C as required.

Referring to Fig. 3 after the scalding and plucking the poultry is led along an out-feed line 40 to the transfer station 7 for transfer to an in-feed line 41 for the evisceration process. The transfer is effected automatically by taking up chickens from the in feed line 40 onto an in feed disc 45, delivering the chickens onto a transfer disc 46 and transferring the chickens from the

transfer disc 46 to an outfeed disc 47 for hanging on poultry hooks on the outfeed line 41.

First and second tachometers respectively are provided on the infeed line 40 and outfeed line 41. The tachometers monitor the speed of the infeed and outfeed lines 40,41 and communicate with a controller. The controller monitors any variation in speed between the lines 40,41 and outputs signals to automatically adjust the speed of the motors driving the conveyor lines before and after the transfer station 7 as required. This is done by varying the frequency of the power supply to the various motors as required. In this way the speeds of the infeed and outfeed lines 40,41 are closely matched ensuring optimum processing efficiency as chickens are available to the evisceration line on demand.

We have found that the sequence and layout of the evisceration steps as illustrated in Fig. 5 has provided optimum processing of chickens through the evisceration process.

Referring particularly to Fig. 6 there is illustrated a neck trimming machine used in the method of the invention. The neck trimming machine includes a ramp arrangement 50 along which the necks of the chickens are led to a cutting station 51 including a cutting blade 52 which trims the neck of the chickens as it passes through the cutting station. The necks are harvested and delivered along a chute 53 for offal processing.

Referring particularly to Figs. 7 and 8 a chilling room 60 used in the method of the invention is diagrammatically illustrated. The chilling room has an inlet 61, and an outlet 62. Chilled air is circulated through the chilling room 60 as poultry passes through it by a fan 63.

Typically the residence time in the chiller room is approximately 30 minutes. It will be noted that the chiller room 60 is on two levels, the poultry entering the chiller room at a lower level 64 and being led around the lower level along a circuit to a path on an upper level 65 from which the chilled poultry is delivered. As the poultry passes through the chilling room the surface of the poultry is sprayed with cold water from spray heads 66. This has the advantage of preventing excess moisture being removed from the poultry, particularly adjacent the outer skin. If excess moisture is removed barking of the skin will occur leading to an undesirable texture and taste on cooking. The water spray heads 66 are located as desired throughout the chiller room, preferably at both the upper and lower levels 64,65.

Referring to Fig. 9 a shackle used in the method of the invention is illustrated in use. A conventional shackle is illustrated on the left hand side of Fig. 9 and comprises a hook member 70 which is hooked at 73 onto an eyelet 72 of a conventional poultry hanging hook 75 at a lower end thereof and hooked at 76 unto a hanging hook 77 of an overhead conveyor. Because of the nature and configuration of this known arrangement there is a tendency for the poultry to swing in the direction of the arrows X in Fig. 9 as it is moved along the overhead conveyor. This leads in some cases to misalignment of the poultry at various stages in the process and in particular with the knives used in killing the poultry. To overcome this difficulty we have substituted a shackle in the form of a bar 80 which is pivotally mounted at a lower end 81 to the poultry hook 72 and at an upper end 82 to the overhead conveyor hook 77. A link chain 85 is used to connect adjacent shackles 80, the chain 85 being connected intermediate the ends of the shackles 80 as illustrated. This shackle support arrangement is effective in us and

prevents the tenancy of a collection of shackles to swing thus giving considerably improved processing efficiency as the poultry is delivered at all stages at the required orientation to the various operating machinery.

The invention provides a highly efficient method of processing poultry. The method is efficient not only in energy usage but also in throughput as the various stages in the procedure are optimised and interconnected in an efficient manner. The average processing time is therefore reduced allowing poultry to be killed, scalded, plucked, eviscerated, washed, in-line chilled and packaged in a single work shift. The quality of the finished poultry is also superior.

Many variations on the specific embodiments of the invention described will be readily apparent and accordingly the invention is not limited to the embodiments hereinbefore described but may be varied in both construction and detail.

CLAIMS

1. A method of processing poultry comprising the steps in sequence of:-

unloading live poultry from crates,

hanging the poultry on a shackle,

stunning the poultry,

killing the poultry,

passing the poultry through a scalder, preheating supply water for the scalder being preheated in a preheater,

plucking feathers from the poultry in a plucking machine,

transferring the poultry from a take-off line from the scalder to an input to an evisceration line,

cutting the poultry vent,

eviscerating the poultry through the vent,

harvesting usable organs from the poultry and passing remaining offal to a rendering process,

cropping the poultry,

slitting the neck of the poultry,

breaking the neck of the poultry,

plucking any remaining feathers from the poultry,

trimming the neck skin of the poultry,

removing the lungs from the poultry,

washing the poultry,

leading the poultry through an air chilling room,

periodically spraying cold water onto the surface of the poultry as it is led through the air chilling room,

weighing the chilled poultry, and

packing the poultry.

2. A method as claimed in claim 1 wherein the method includes the steps of:-

rendering offal produced in the poultry processing method,

extracting waste heat from the rendering process, and

using the extracted waste heat for preheating the water supply to the scalder.

3. A method as claimed in claim 2 wherein the rendering includes the step of cooking the offal in a cooker

and the waste heat is extracted from steam generated in the cooker.

4. A method as claimed in claim 3 wherein the method includes the step of condensing the cooker steam to produce hot water, and extracting heat from the hot water to heat a water supply to the scalder.

5. A method as claimed in claim 4 including the step of sensing the temperature of the heated scalder water supply and delivering the heated scalder water to the scalder when a preset temperature of scalder water supply has been achieved, scalder water being circulated through the heat exchanger until the preset temperature has been reached.

6. A method as claimed in claim 5 wherein the preset temperature for the scalder water supply is approximately 55°C.

7. A method as claimed in any of claims 4 to 6 wherein hot water generated on condensing the cooker steam is cooled in a cooling tower.

8. A method as claimed in any preceding claim comprising the steps of sensing the speed of the take-off line from the scalder and the speed of the evisceration line, and matching the speed of the lines.

9. A method as claimed in claim 8 wherein the speeds of the lines are sensed by tachometers which provide input signals to a controller, the controller delivering output signals to change the speed of the conveyor lines as required to match the speeds of the infeed and take off lines at the transfer station.

10. A method as claimed in claim 9 wherein the output from the controller varies the speed of the motors driving the conveyor lines.

11. A method as claimed in claim 10 wherein the speed of the motors are varied by regulating the frequency of the power supply to the motors.

12. A method as claimed in any preceding claim wherein the poultry are led through lower and upper levels in a chiller room and cold water is periodically sprayed onto the surface of the poultry as it is led through the lower and upper levels of the chiller room.

13. A method as claimed in claim 12 wherein the poultry is chilled to a temperature of approximately 0°C.

14. A method as claimed in claim 13 wherein the residence time in the chiller room is at least 20 minutes.

15. A method as claimed in claim 14 wherein the residence time in the chiller room is approximately 30 minutes.

16. A method as claimed in any preceding claim wherein the neck skin is trimmed by leading the poultry with the necks lowermost along a ramp to a cutting station having a cutting blade which removes the neck skin as the poultry passes through the cutting station.

17. A method as claimed in any preceding claim including the step of preventing excess swing of a shackle by hanging the poultry on a shackle having a shackle bar which is pivotally mounted at a lower end to a poultry handling hook means and at an upper end to an overhead conveyor hook, a semi-flexible link

extending between adjacent shackles intermediate the ends thereof.

18. A method as claimed in claim 17 wherein the semi-flexible link comprises a chain link.

19. A method substantially as hereinbefore described with reference to the accompanying drawings.

20. Poultry whenever processed by a method as claimed in any preceding claim.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report) -16-

Application number

GB 9315224.7

Relevant Technical fields

(i) UK Cl (Edition L/N) A2U: U1PX; U1MX
A1M: MDD; MDE

(ii) Int Cl (Edition 5) A22B; A22C

Search Examiner

B J GARDNER

Databases (see over)

(i) UK Patent Office

(ii) NONE

Date of Search

7 OCTOBER 1993

Documents considered relevant following a search in respect of claims 1 TO 20

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
E,X	GB 2264217 (CLERCREST LIMITED) - see particularly paricular embodiment	1 at least
A	US 4860403 (CAMPBELL SOUP COMPANY) - see part examples	1

	to claim

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